

REMARKS

Claims 16-29 are currently pending in the application. By this amendment, claims 17 and 28 are amended for the Examiner's consideration. The above amendments do not add new matter to the application and are fully supported by the specification. For example, support for the amendment to claim 28 is found at paragraph [0048] of the instant specification. Reconsideration of the rejected claims in view of the above amendments and the following remarks is respectfully requested.

Present Amendment is proper for entry

Applicant respectfully submits that the instant amendment is proper for entry after final rejection. Applicant notes that no question of new matter is presented nor are any new issues raised in entering the instant amendment of the claims and that no new search would be required. Moreover, Applicant submits that the instant amendment places the application in condition for allowance, or at least in better form for appeal. Accordingly, Applicant requests the Examiner to enter the instant amendment, consider the merits of the same, and indicate the allowability of the present application and each of the pending claims. Applicant notes, in particular, that claims 17 and 28 have been amended to address the formal rejections which reduces the issues for appeal. Furthermore, Applicant has not added more claims than were previously pending. Finally, in a telephone discussion with the Examiner on September 14, 2006, the Examiner indicated that he may enter the amendment if it addresses the Section 112 rejections consistent with the MPEP. Applicant reminds the Examiner that the MPEP

Section 706.07(f) states the following:

The refusal to enter the proposed amendment should not be arbitrary. The proposed amendment should be given sufficient consideration to determine whether the claims are in condition for allowance and/or whether the issues on appeal are simplified.

As the Examiner well knows, claim amendments which address formal rejections should be entered because they reduce the number of issues for appeal.

Claim Objections

Claims 16-29 were objected to on the basis of minor asserted informalities.

The Examiner asserts that claims 16, 24 and 29 are unclear because they recite the terms lower region, middle region and upper region. Applicant respectfully disagrees. One having ordinary skill in the art, having read the specification and the drawings, would clearly understand what is recited in the claims. Applicant reminds the Examiner that the claims are not reviewed in a vacuum. At the very least, these terms mean what they say, that is a lower region is arranged below and upper region and a middle region is arranged between the upper and lower regions.

The Examiner asserts that claims 17, 19 and 20 are unclear because they do not clarify the relationships between certain doping steps. Applicant respectfully disagrees. One having ordinary skill in the art, having read the specification and the drawings, would clearly understand what is recited in the claims. Claim 17, for example, clarifies the position of the cathode, the HA junction, and the anode relative to the upper, middle and lower regions. This is fully shown in e.g., Figs. 2 and 3.

The Examiner asserts that claim 29 is unclear because it does not clarify the

relationships between the collector region and the cathode region. Applicant respectfully disagrees. One having ordinary skill in the art, having read the specification and the drawings, would clearly understand what is recited in the claims. Claim 29, for example, clarifies the collector region and the cathode region are formed in a single doping step. This is fully explained in the specification.

Accordingly, Applicant respectfully requests that the instant objection be withdrawn.

Section 112, 1st Paragraph

Claim 28 was rejected as failing to comply with the written description requirement.

Applicant submits that the basis of rejection has been addressed by the instant amendment of claim 28 and has therefore been rendered moot. Support for the amendment to claim 28 can be found in paragraph [0048] which specifically states the following:

As thus described, the active region of the varactor including the cathode, collector, HA junction, and anode is formed by three doping steps. Each of the three doping steps has approximately less energy than the previous doping step in order to deposit its respective dopants at successively shallower depths. Because the active region of the varactor is formed solely by the doping steps, the C-V tuning curve of the resulting varactor is less affected by growing or etching steps, and there is less manufacturing variation from unit to unit. Thus, the resulting varactor is simpler and less expensive to fabricate, and may be manufactured to tighter tolerances.

Accordingly, as claim 28 is fully compliant with the written description requirement, Applicant respectfully requests that the instant rejection be withdrawn.

Section 112, 2nd Paragraph

Claim 28 was also rejected as indefinite on the basis of failing to comply with the written description requirement.

Applicant submits that the basis of rejection has been addressed by the instant amendment of the claims and has therefore been rendered moot. Support for the amendment to claim 28 can be found in paragraph [0048].

Accordingly, Applicant respectfully requests that the instant rejection be withdrawn.

35 U.S.C. §102 Rejection

Claims 16-18 and 24-29 were rejected under 35 U.S.C. §102(b) for being anticipated by JP 4-343479 to IGARASHI et al. This rejection is respectfully traversed.

In order to establish a *prima facie* case of anticipation under 35 U.S.C. § 102, a single prior art reference must disclose each and every element as set forth in the subject claim. *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ 2d 1051, 1053 (Fed. Cir. 1987). Applicants respectfully submit that a *prima facie* case of anticipation has not been established as the applied reference fails to teach each and every element of the claims.

More particularly, claim 16 recites, *inter alia*,

doping a lower region of the semiconductor substrate with a first dopant at a first energy level;
doping a middle region of the semiconductor substrate with a second dopant at a second energy level lower than the first energy level; and
doping an upper region of the semiconductor substrate with a third dopant at a third energy level lower than the second energy level.

Additionally, claim 24 recites, *inter alia*,

that the doping of the middle region has approximately less energy than the doping of the lower region and that the doping of the upper region has approximately less energy than the doping of the middle region.

Finally, claim 29 recites, *inter alia*,

doping a lower region of the semiconductor substrate with a first dopant at a first energy level;
doping a middle region of the semiconductor substrate with a second dopant at a second energy level lower than the first energy level; and
doping an upper region of the semiconductor substrate with a third dopant at a third energy level lower than the second energy level,
wherein the semiconductor substrate includes a collector region and a cathode that are formed in a single doping step via energy distribution of a single dopant type.

The Examiner is of the opinion that the features of the claimed invention are disclosed in IGARASHI and the discussion thereof in the English language abstract thereof. Applicant respectfully disagrees and submits that all of the features of claims 16, 24 and 29 have not been shown to be disclosed by IGARASHI.

In addition to the reasons already made of record, Applicant submits that IGARASHI does not disclose, or even suggest, the three recited doping steps, much less, that each of the three doping steps has less energy than the previous doping step. Nor has the Examiner shown otherwise, or even identified the specific locations in IGARASHI which allegedly disclose these features.

Applicant submit that the Examiner has failed to identify where in IGARASHI there is disclosed each and every features recited in at least claims 16, 24 and 29. While the Examiner has provided an English language translation of this document, the Examiner has failed to identify the specific language which discloses each feature

recited in the above-noted claims. As such, the Examiner has failed to set forth a *prima facie* case of anticipation.

Applicant emphasizes that IGARASHI has not been shown to disclose, or even suggest, the three recited doping steps, much less, that each of the three doping steps has approximately less energy than the previous doping step. Applicant notes, in particular, that paragraphs [0012] and [0013] of the English language translation of IGARASHI disclose two ion implanting steps using different energy levels. Accordingly, the English language translation of IGARASHI clearly does not specifically disclose doping the three recited regions and the recited energy levels, much less: (i) doping a lower region of the semiconductor substrate with a first dopant at a first energy level, doping a middle region of the semiconductor substrate with a second dopant at a second energy level lower than the first energy level, and doping an upper region of the semiconductor substrate with a third dopant at a third energy level lower than the second energy level (claim 16); (ii) that the doping of the middle region has approximately less energy than the doping of the lower region and that the doping of the upper region has approximately less energy than the doping of the middle region (claim 24); (iii) doping a lower region of the semiconductor substrate with a first dopant at a first energy level, doping a middle region of the semiconductor substrate with a second dopant at a second energy level lower than the first energy level, and doping an upper region of the semiconductor substrate with a third dopant at a third energy level lower than the second energy level, wherein the semiconductor substrate includes a collector region and a cathode that are formed in a single doping step via energy distribution of a

single dopant type (claim 29). These features are clearly not disclosed or suggested in the English language translation of IGARASHI.

Furthermore, the rejection of dependent claims 17, 18 and 25-28 is improper at least because these claims depend from claims 16 and 24, which are believed to be allowable over the applied art of record.

Accordingly, Applicants respectfully request that the rejection over claims 16-18 and 24-28 be withdrawn.

35 U.S.C. §103 Rejection

Claims 19-23 were rejected under 35 U.S.C. §103(a) for being unpatentable over IGARASHI in view of AAPA. This rejection is respectfully traversed.

While acknowledging that IGARASHI fails to disclose or suggest the features of these claims, the Examiner is of the opinion that the features of claims 19-23 are obvious in view of AAPA because the recited features are asserted to be conventional. Applicants respectfully disagree with the Examiner.

Although not specifically addressed by the Examiner, in addition to the reasons already made of record, Applicant submits that AAPA does not disclose, or even suggest, the three recited doping steps, much less, that each of the three doping steps has less energy than the previous doping step. Nor has the Examiner shown otherwise. Applicant notes, in particular, that the language in the instant specification describing Fig. 1 explains that the subcollector 14 is doped with a 40 KeV energy level, that the collector 16 is doped with a 700 KeV energy level, and that the HA junction 24 is doped

with a 40 KeV energy level. Such language is clearly not suggestive of the three doping steps having approximately less energy than the previous doping step, as recited in the claims.

Because, as noted above, IGARASHI does not disclose, or even suggest, the three recited doping steps, much less, that each of the three doping steps has less energy than the previous doping step, and because AAPA does not cure these deficiencies, Applicant submit that the Examiner has failed to set forth a *prima facie* case of unpatentability.

Applicant submits that there is no motivation to modify IGARASHI in view of AAPA or what is asserted to be known in the art in a manner which would render obvious Applicant's invention, and additionally, Applicant submits that there is no motivation or rationale disclosed or suggested in IGARASHI or AAPA to modify IGARASHI in the manner suggested by the Examiner. The Examiner's opinion does not provide a proper basis for these features or for the motivation to modify or combine these documents in the manner suggested by the Examiner. This is based, in part, on the fact that all of the features of the claimed invention are not even shown in the IGARASHI reference. Therefore, Applicant submits that the invention as recited in at least independent claims 16, 24 and 29 is not rendered obvious by any reasonable inspection and interpretation of the disclosure of the IGARASHI reference in view of AAPA.

Applicant submits that the Examiner has neglected to set forth any proper basis for combining the teachings of the applied documents. In establishing a *prima facie*

case of obviousness under 35 U.S.C. § 103, it is incumbent upon the Examiner to provide a reason *why* one of ordinary skill in the art would have found it obvious to modify a prior art reference or to combine reference teachings to arrive at the claimed invention. See *Ex parte Clapp*, 227 USPQ 972 (B.P.A.I. 1985). To this end, the requisite motivation must stem from some teaching, suggestion or inference in the prior art as a whole or from the knowledge generally available to one of ordinary skill in the art and not from Applicant's disclosure. See, for example, *Uniroyal, Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 5 USPQ2d 1434 (Fed. Cir. 1988). As noted above, each of the applied art is silent with regard to a number of recited features. Moreover, none of the applied art teach or suggests modifying the structure or method of IGARASHI in the manner asserted by the Examiner.

Because the art of record fails to provide any reasonable explanation why one ordinarily skilled in the art would utilize such an arrangement, and/or fails to disclose or suggest the problems that such an arrangement would address, Applicant submits that the art of record fails to provide the requisite motivation or rationale as to *why* one ordinarily skilled in the art would modify IGARASHI in the manner asserted by the Examiner. That is, Applicant submits that because the Examiner has not set forth an articulable reason found in the art of record for modifying IGARASHI in the manner asserted by the Examiner, the instant rejection has no basis in the art of record, such that the rejection is improper and should be withdrawn.

Rejections based on 35 U.S.C. § 103 must rest on a factual basis with these facts being interpreted without hindsight reconstruction of the invention from the prior

art. The Examiner has the initial duty of supplying the factual basis for the rejection and may not, because of doubt that the invention is patentable, resort to speculation, unfounded assumption or hindsight reconstruction to supply deficiencies in the factual basis. See *In re Warner*, 379 F.2d 1011, 1017, 154 USPQ 173, 177 (CCPA 1967). As stated in *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1553, 220 USPQ 303, 312-313 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984):

[t]o imbue one of ordinary skill in the art with knowledge of the invention in suit, when no prior art reference or references of record convey or suggest that knowledge, is to fall victim to the insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher.

Applicant submits that the only reason to combine the teachings of the applied references in the manner proposed by the Examiner is the result of a review of Applicant's disclosure and the application impermissible hindsight.

Furthermore, the Examiner has not shown how the combination of IGARASHI in view of AAPA can be read to disclose or suggest, in addition to the above-noted combination of features of claim 16:

- (i) doping a bottom layer of the lower region of a higher concentration of the first dopant than an upper layer of the lower region (claim 19);
- (ii) forming a collector of the varactor in the upper layer of the lower region of the semiconductor substrate (claim 20);
- (iii) forming at least one isolation region adjacent to the lower, middle, and upper regions of the semiconductor substrate (claim 21);
- (iv) forming at least one reach-through implant in electrical communication with the lower region of the semiconductor substrate (claim 22); and
- (v) forming a silicide layer on a top of the semiconductor substrate above the upper region (claim 23).

Accordingly, Applicant respectfully requests that the rejection over claims 19-23 be withdrawn.

CONCLUSION

In view of the foregoing amendments and remarks, Applicant submits that all of the claims are patentably distinct from the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue. The Examiner is invited to contact the undersigned at the telephone number listed below, if needed. Applicant hereby makes a written conditional petition for extension of time, if required. Please charge any deficiencies in fees and credit any overpayment of fees to Deposit Account No. 09-0456.

Respectfully submitted,
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